Priapism

BY

Dr. Abdel Shakour A. Al Mohamady

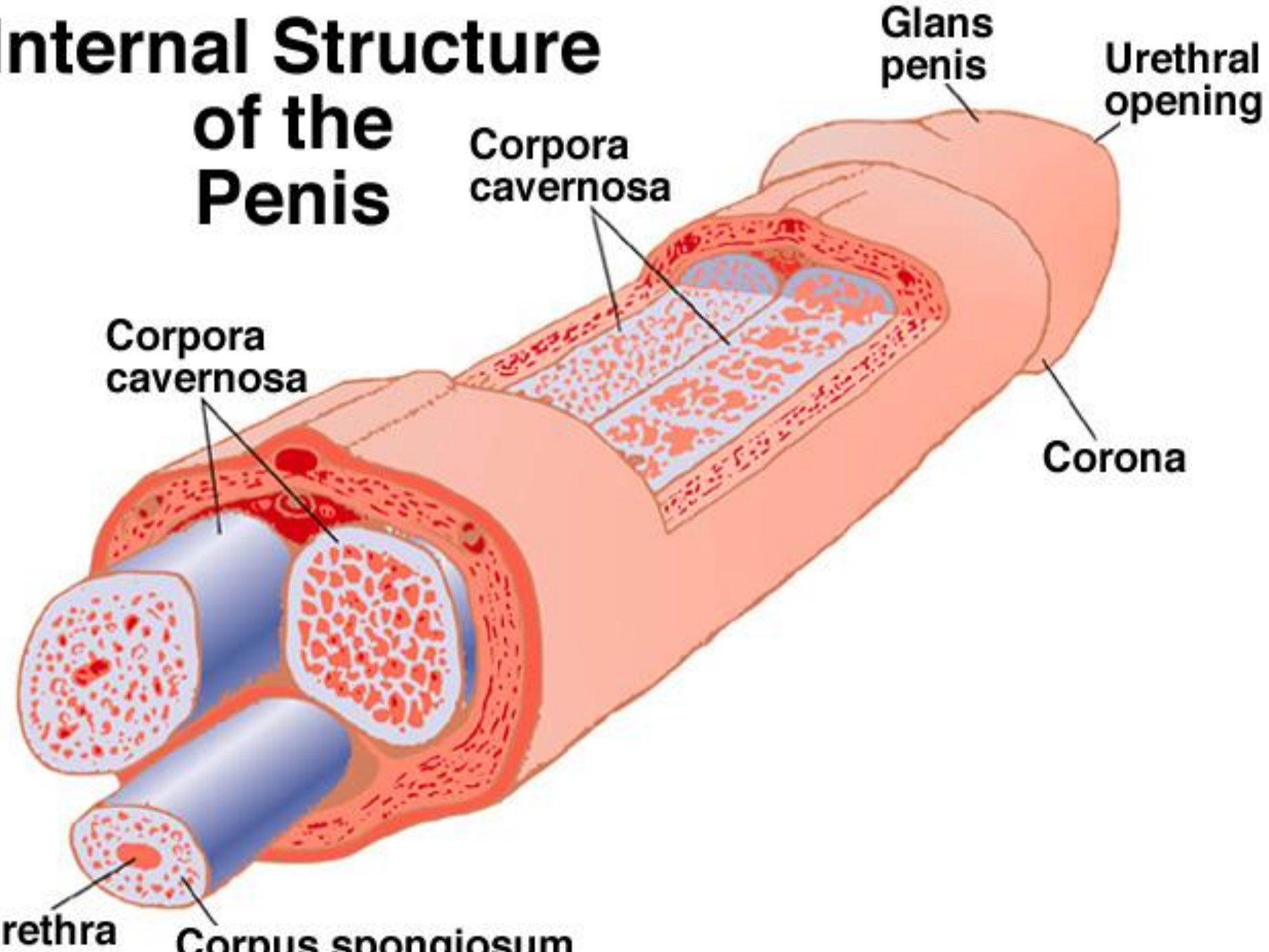
Prof.of Dermatology ,Venereology And Andrology

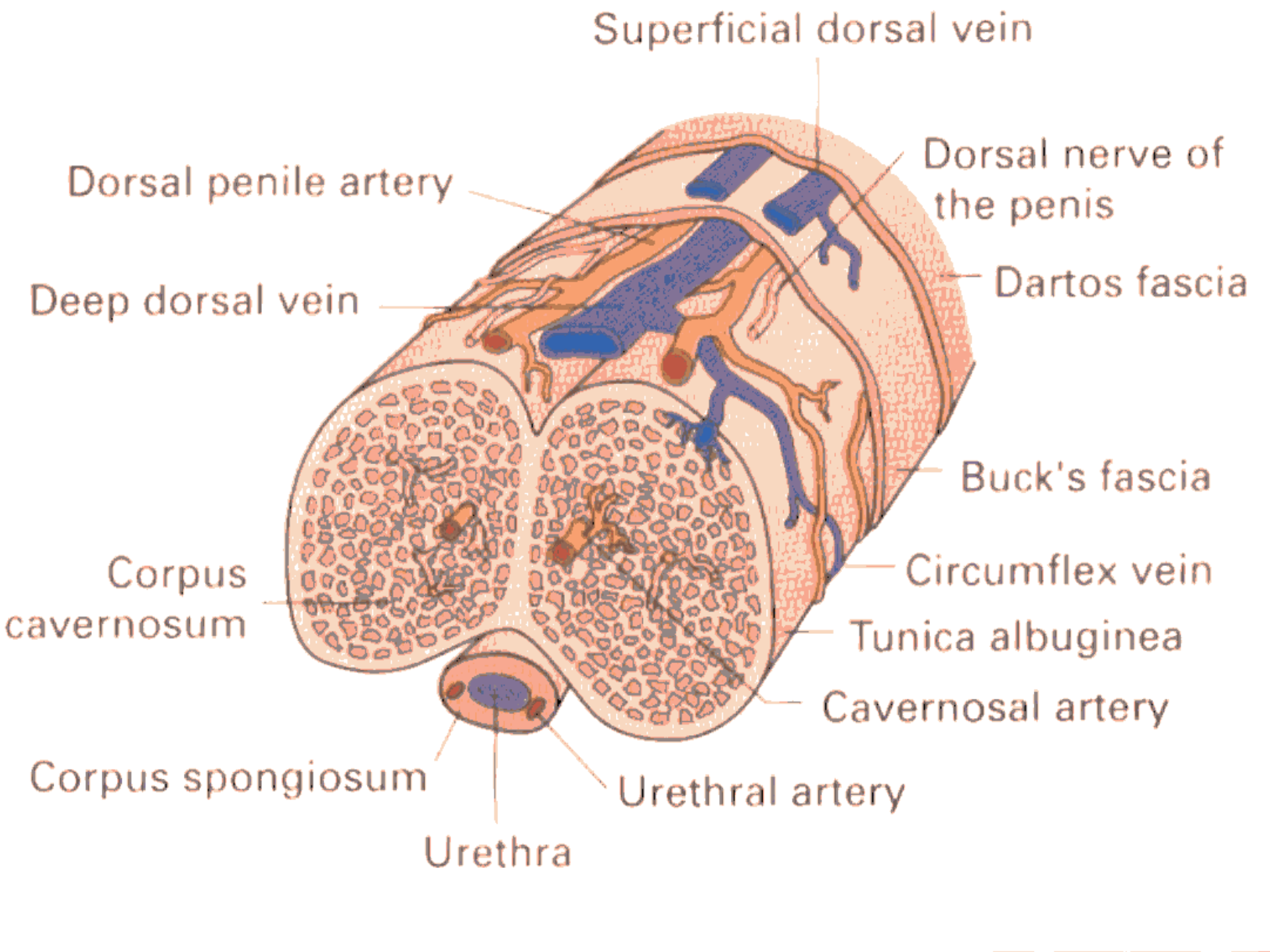
Faculty of Medicine

Al-Azhar University

Facts about the penis

Internal Structure of the Penis




Superficial dorsal vein
Dorsal penile artery
Dorsal nerve of the penis
Deep dorsal vein
Dartos fascia
Buck's fascia
Corpus cavernosum
Circumflex vein
Tunica albuginea
Cavernosal artery
Corpus spongiosum
Urethral artery
Urethra

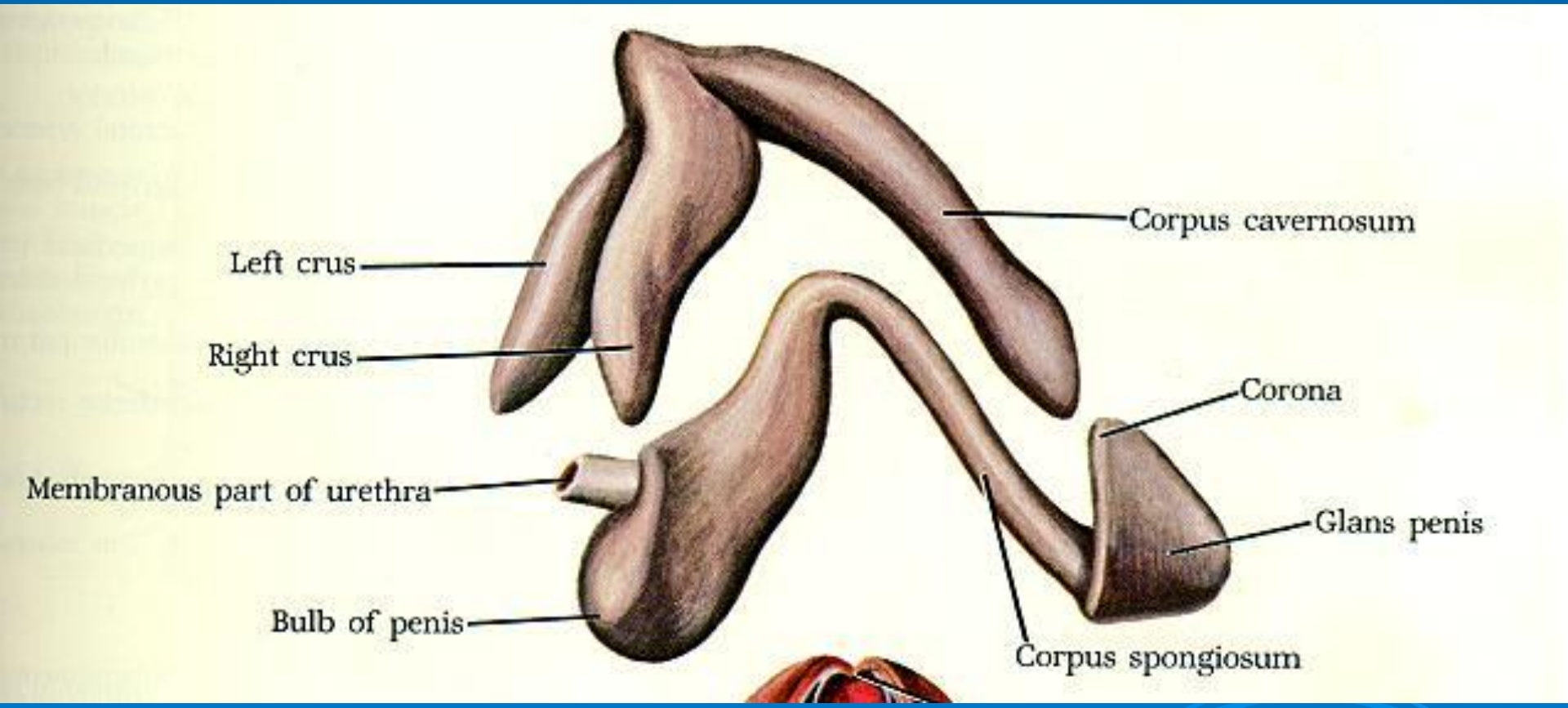
- The penile corpora are specialized vascular beds .

- They are endothelial-lined sinusoidal spaces supported by a framework of:

  Smooth muscles,

  Collagen, nerves

  arterioles and capillaries.


Corpus cavernosum
Left crus
Right crus
Corona
Membranous part of urethra
Glans penis
Bulb of penis
Corpus spongiosum

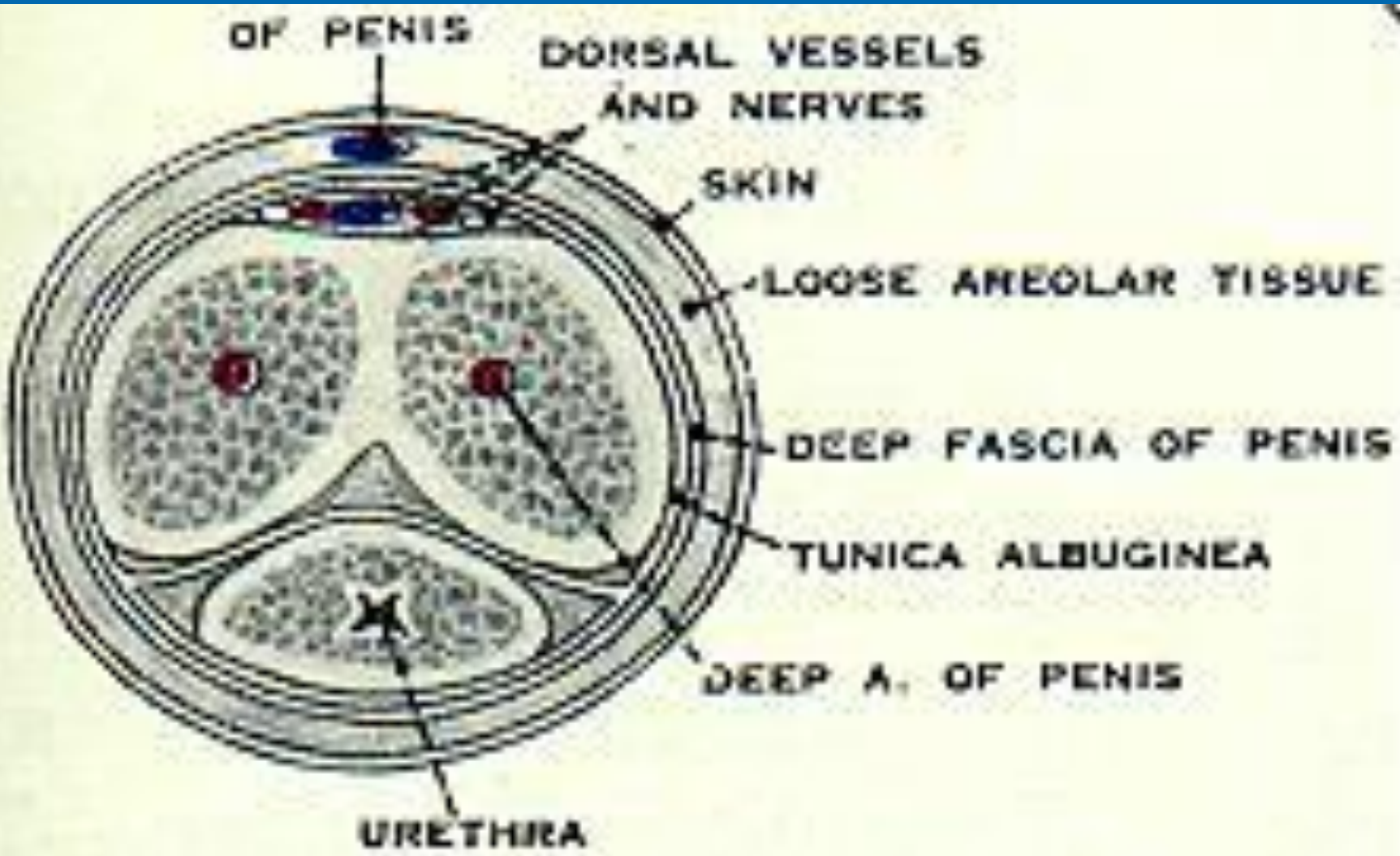
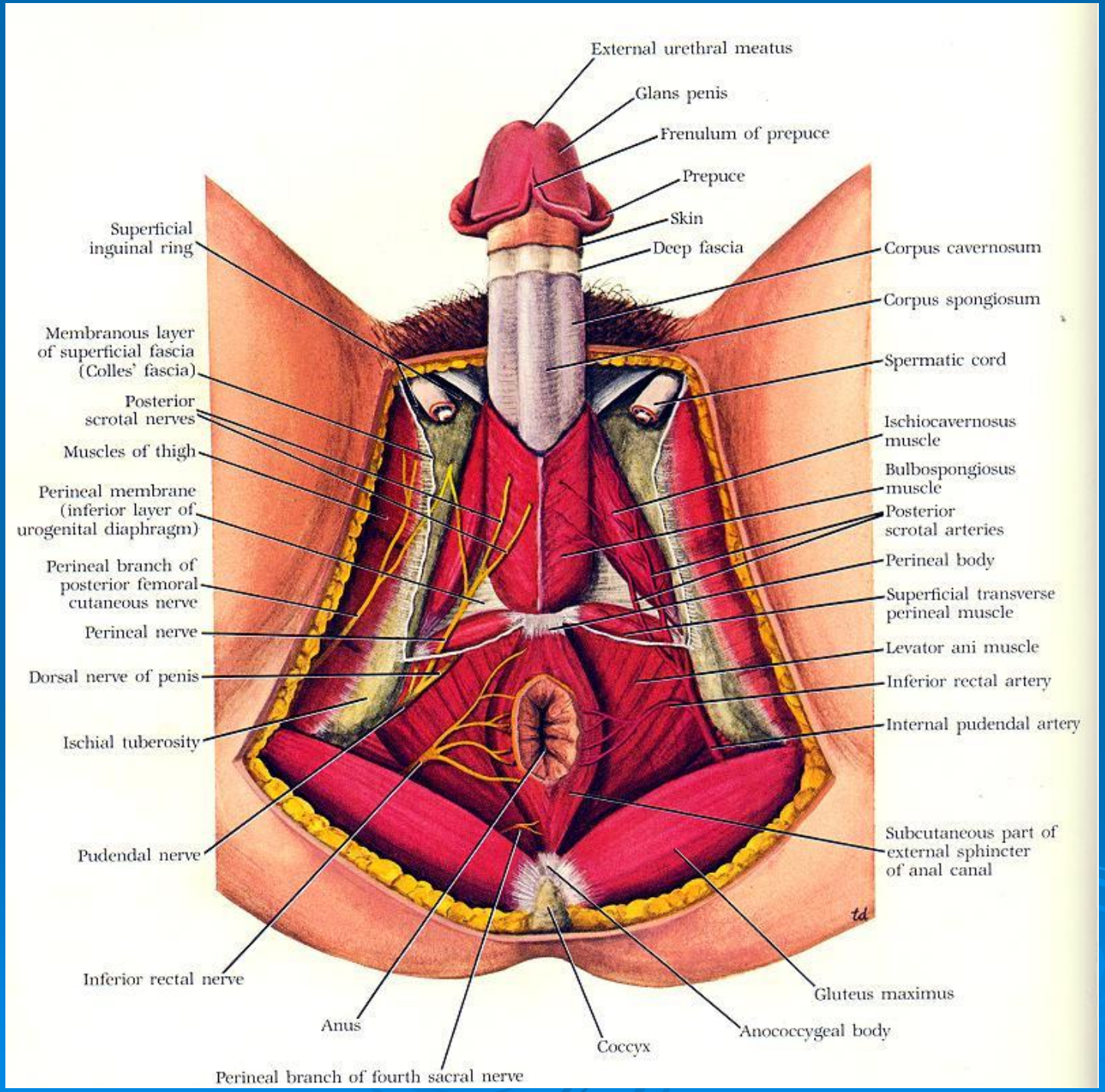
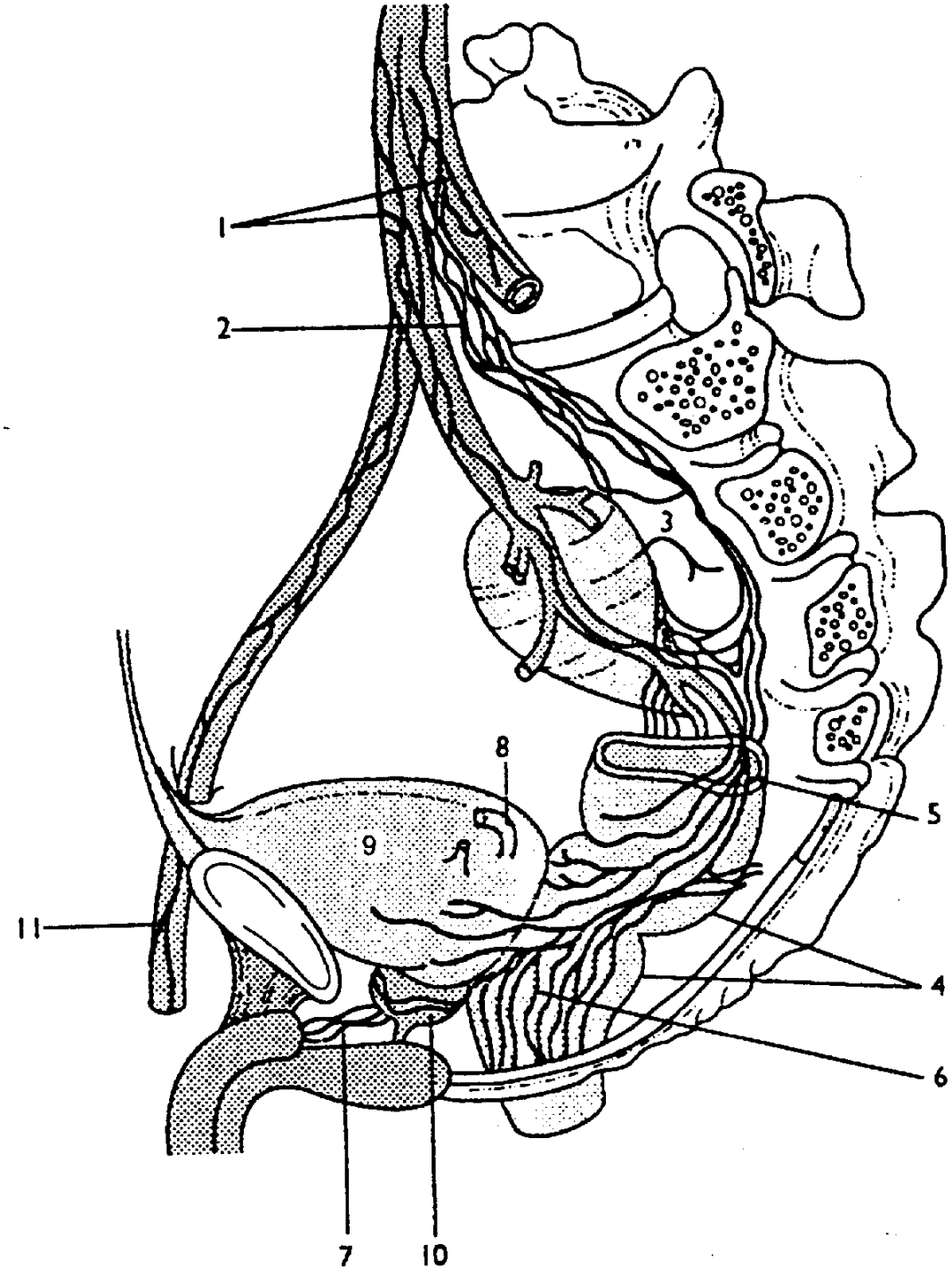


FIG. 521. Schemes to show the s


External urethral meatus
Glans penis
Frenulum of prepuce
Prepuce
Skin
Deep fascia
Superficial inguinal ring
Membranous layer of superficial fascia (Colles' fascia)
Posterior scrotal nerves
Muscles of thigh
Perineal membrane (inferior layer of urogenital diaphragm)
Perineal branch of posterior femoral cutaneous nerve
Perineal nerve
Dorsal nerve of penis
Ischial tuberosity
Pudendal nerve
Inferior rectal nerve
Anus
Perineal branch of fourth sacral nerve
Coccyx
Anococcygeal body
Gluteus maximus
Corpus cavernosum
Corpus spongiosum
Spermatic cord
Ischiocavernosus muscle
Bulbospongiosus muscle
Posterior scrotal arteries
Perineal body
Superficial transverse perineal muscle
Levator ani muscle
Inferior rectal artery
Internal pudendal artery
Subcutaneous part of external sphincter of anal canal
td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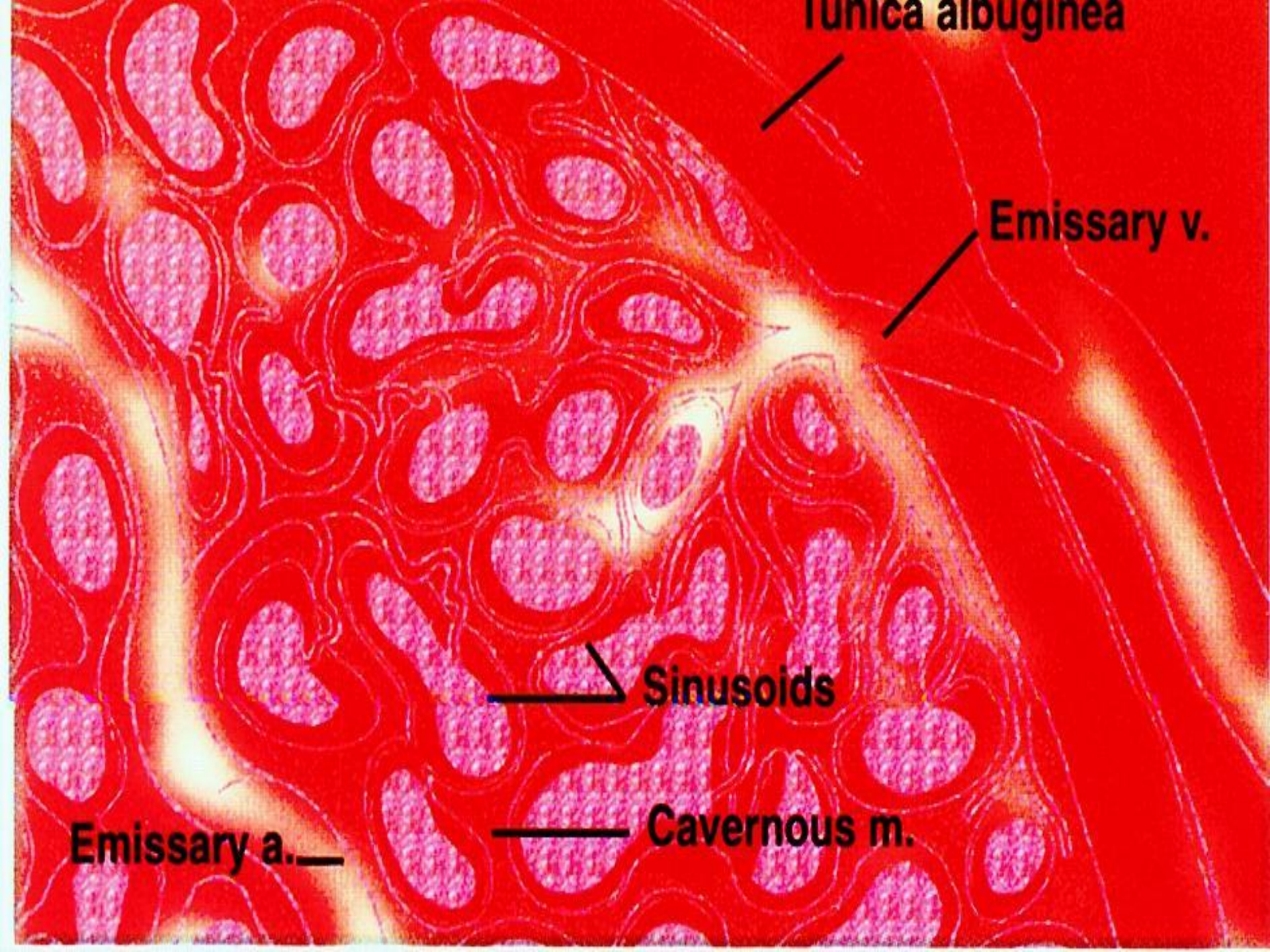
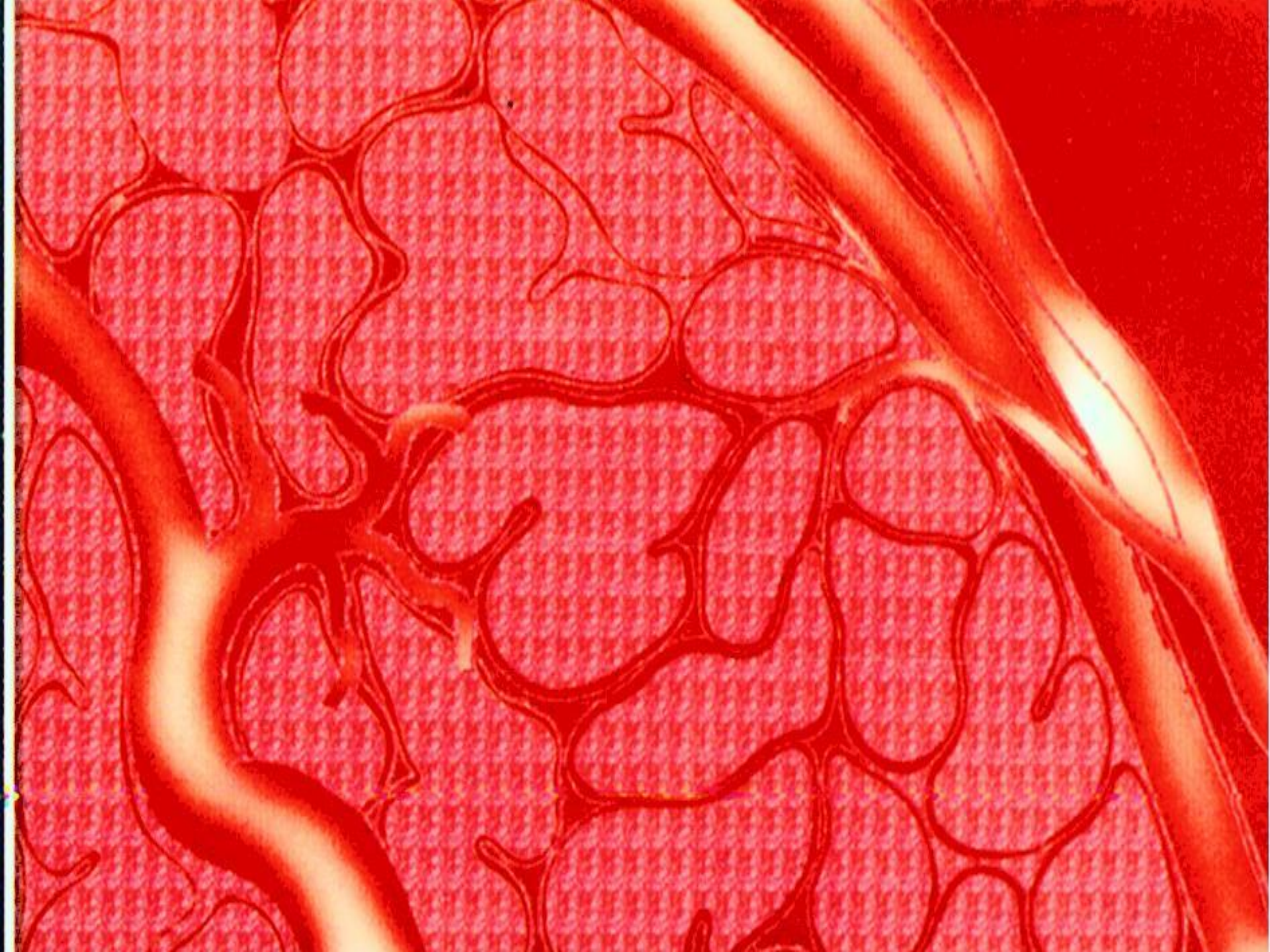
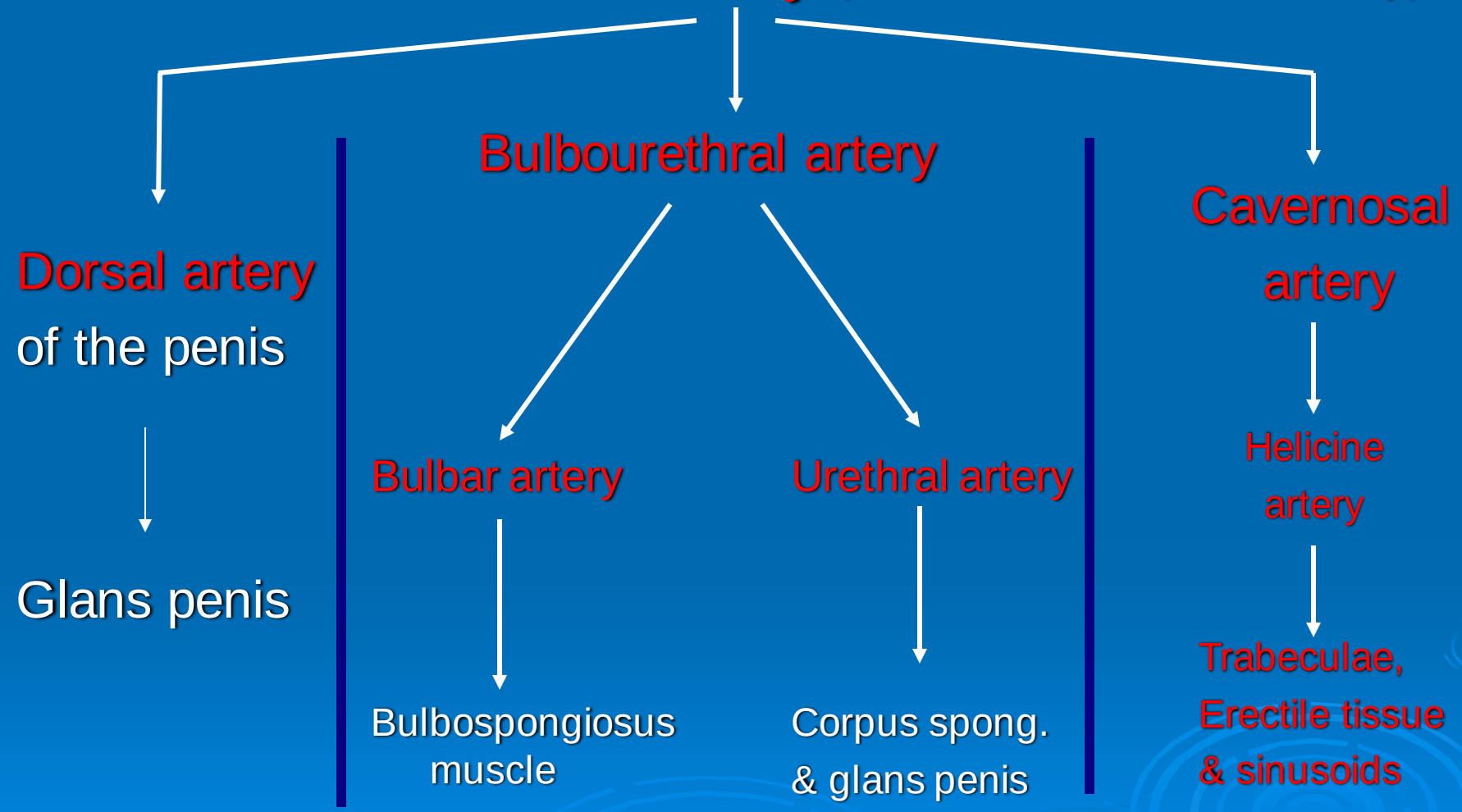

Tunica albuginea
Emissary v.
Sinusoids
Cavernous m.
Emissary a.



The Arterial supply

The arterial supply to the penis is from the **Internal Pudendal Artery** (branch of Internal iliac Artery)



Penile arterial supply

Mainly:

Internal iliac artery

→ Int. pudendal a.

→ branch to perinium

→ common penile a.

Sometimes:

Accessory arteries arising from: ext. iliac, obturator, vesical and femoral arteries.

Their damage during R.prostatectomy or cystectomy vasculogenic E.D.

The Venous drainage

Venous Drainage

- Three systems drain venous blood from the penis

A- Superficial (drain skin & S.C. above Bucks facia)

superficial dorsal vein ⟶ saphenous vein

B- Intermediate beneath Bucks fascia

(glans, C. spog. 2\3 C. cavernosum)

deep dorsal veins and the circumflex veins

⟶ peri prostatic or Santorinis plexus

C- Deep (proximal 1\3 of C.cavernosum & the bulb of uerthera)

⟶

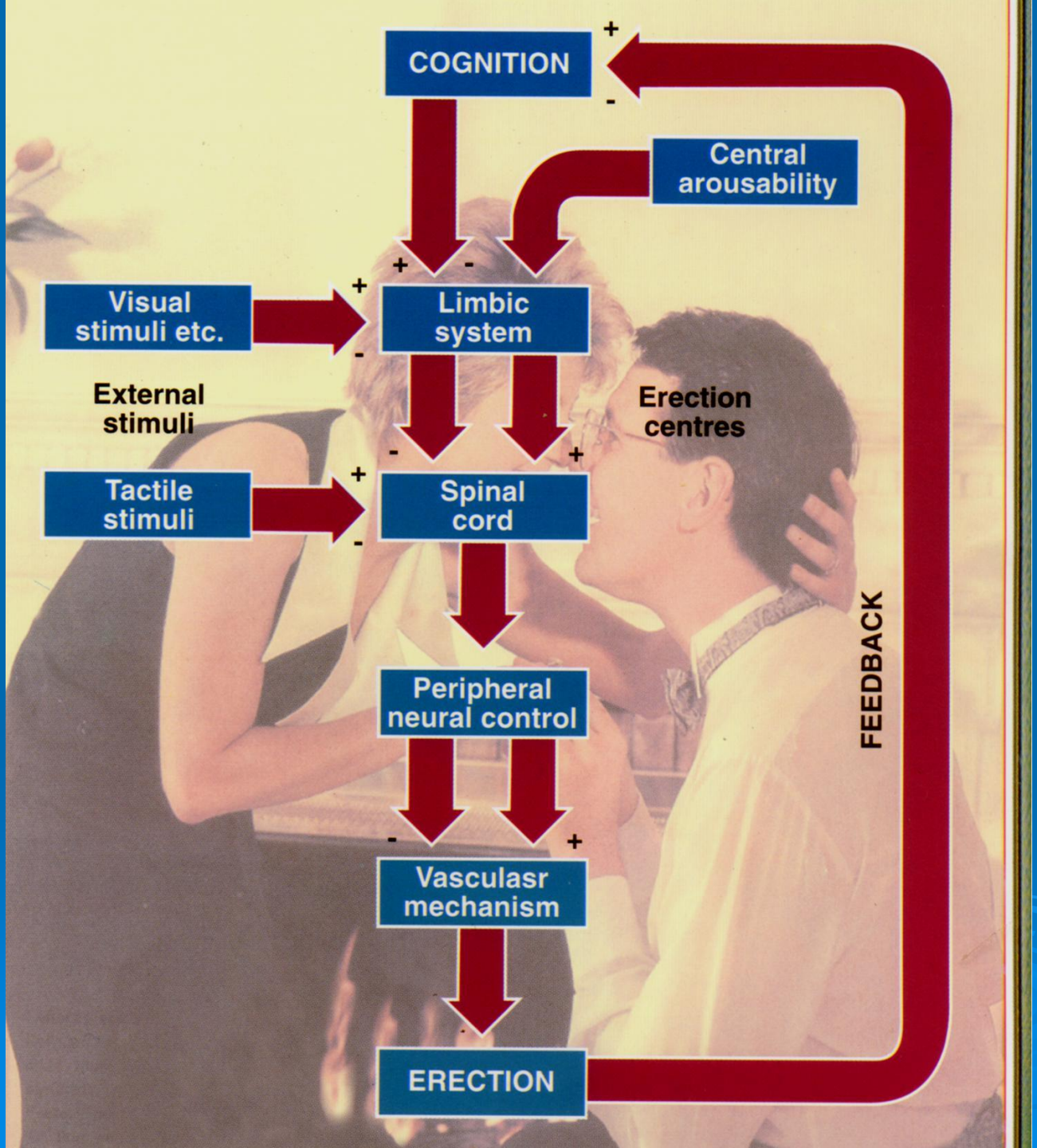
cavernosal veins and crural veins ⟶ internal pudendal veins

Superficial system	Intermediate system	Deep system
Superficial Dorsal vein	Deep dorsal vein	Cavernous vein
Saphenous vein	Prostatic plexus	Internal Pudendal vein

The normal physiology of erection

physiology of Erection

Erection is a vascular event resulting from a complex interplay between the central nervous system (cerebral and spinal) and local factors as smooth muscle and endothelium.


COGNITION
Central arousability
Visual stimuli etc.
Limbic system
External stimuli
Erection centres
Tactile stimuli
Spinal cord
Peripheral neural control
Vasculasr mechanism
ERECTION
FEEDBACK

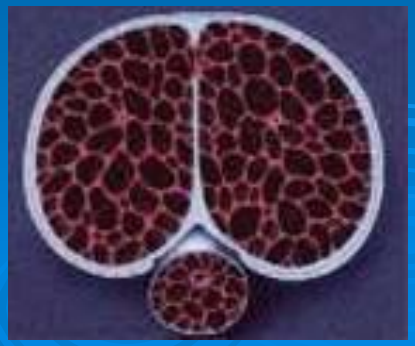
Sexual stimulus

Relaxation of cavernosal and arterial smooth muscle

Engorgement of blood into the cavernosal space

Occlusion of venous return

ERECTION

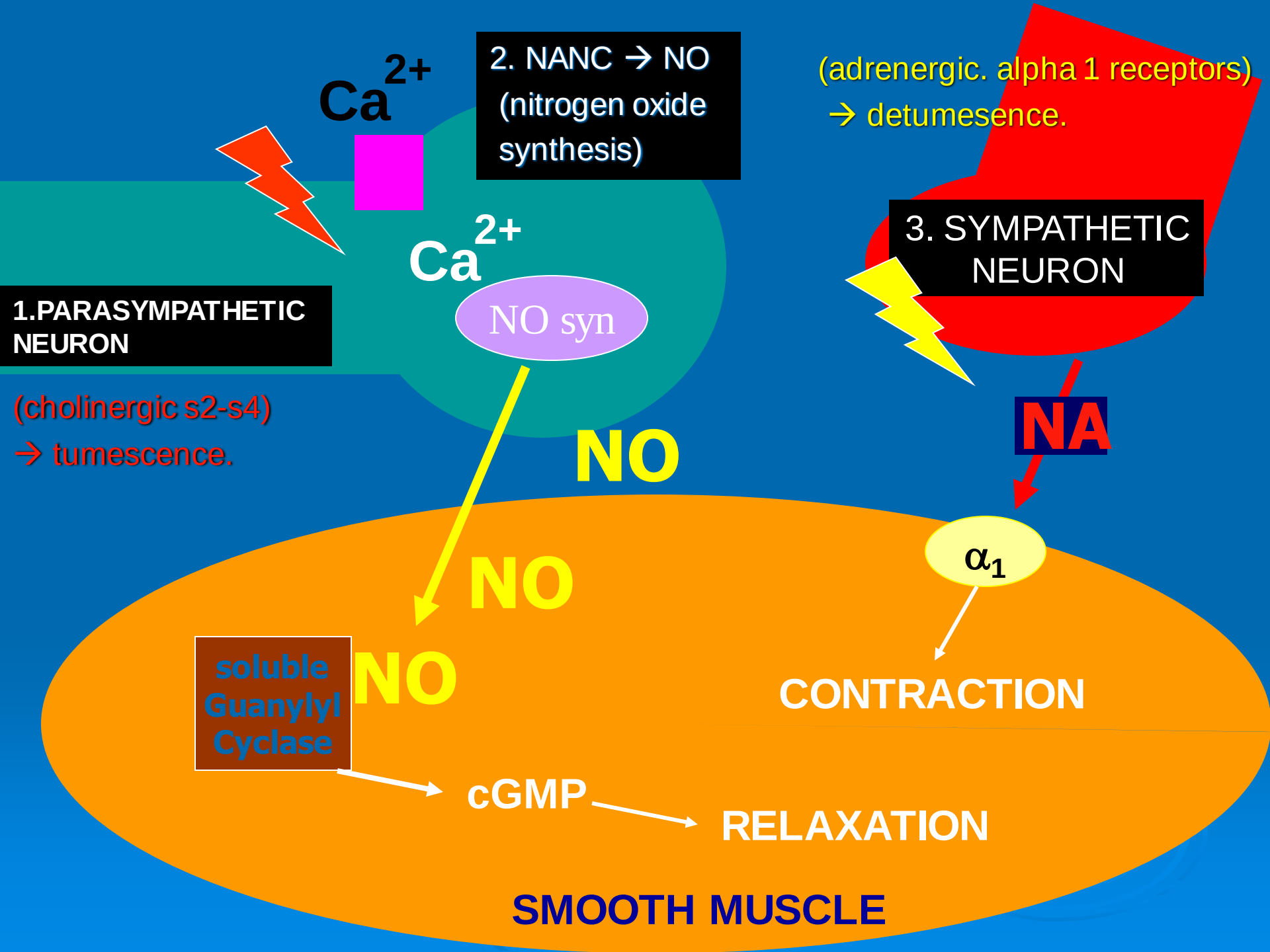


- The erection of the penis is an interaction between :-

Neural component system.

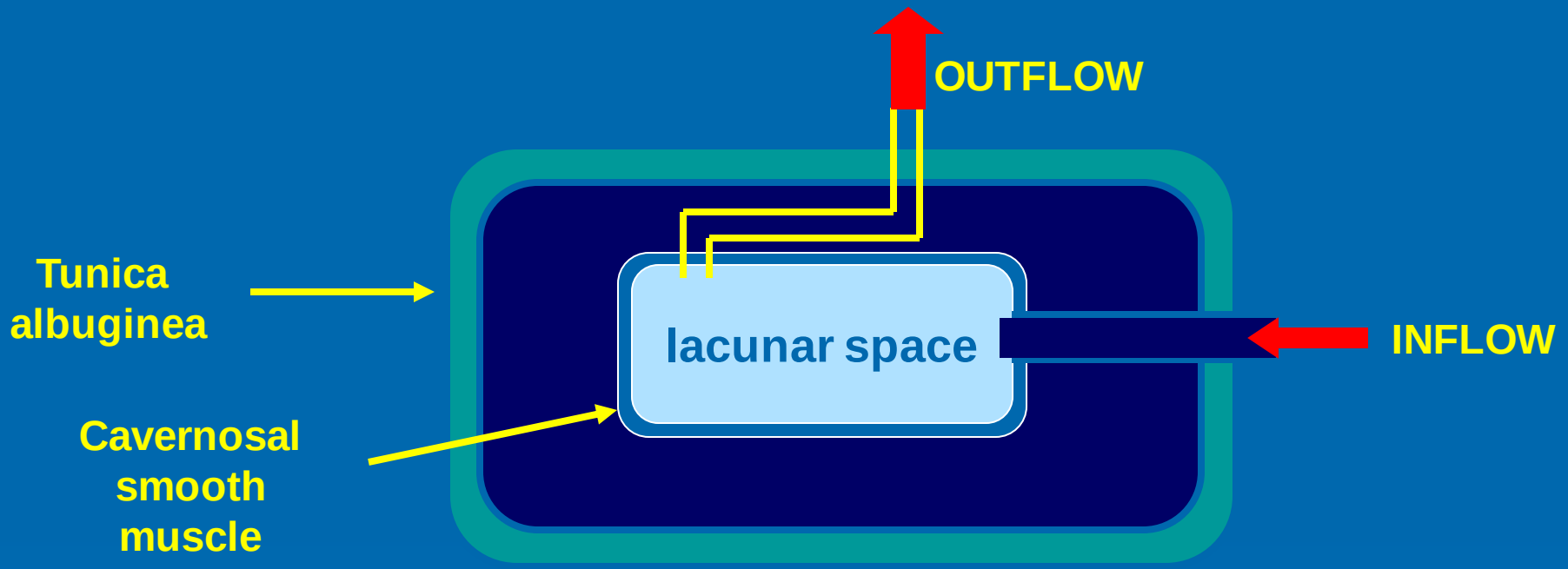
Vascular component system.

Neural component system


2. NANC → NO (nitrogen oxide synthesis)
(adrenergic. alpha 1 receptors) → detumesence.
Ca2+
Ca2+
3. SYMPATHETIC NEURON
1.PARASYMPATHETIC NEURON
NO syn
(cholinergic s2-s4) → tumescence.
NO
NA
NO
α1
soluble Guanylyl Cyclase
NO
CONTRACTION
cGMP
RELAXATION
SMOOTH MUSCLE

Vascular component system

The intercorporal circulation in a flaccid penis



The **Vascular** components of erection is formed of 2 parts.

- Active part
- Passive part

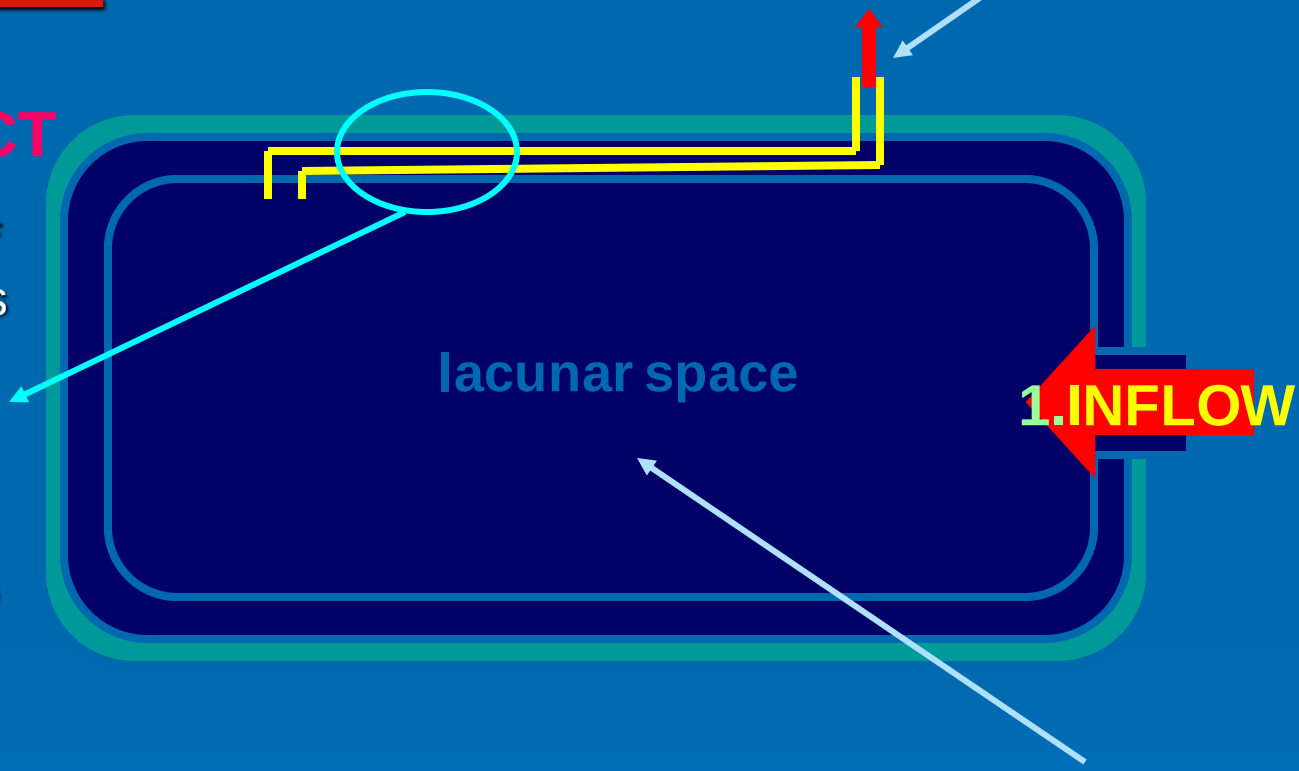
The active part

- Relaxation of the smooth muscles of the corpora
- Increases compliance of the sinusoids and the arterial walls as well as dilatation of the arteries and the arterioles
- Increasing the arterial blood flow to the penis (5-10 fold in comparison to the blood flow in the flaccid state which is around 3-5 ml/min).

The Passive part

4.Decrease of the venous outflow

ERECT



3.Compression of subtunical venous plexus in the trabeculae between the tunica albuginea and the sinusoids → compression of emissary veins

2.trapping the incoming blood by expanding the sinusoids

- Another difference between Flaccid and Erect phases is the O_2 and CO_2 tension in the blood within the penis..

- In the erection state pO_2 is around 40 mm Hg and the pCO_2 is around 40mm Hg too.

- In flaccid state both are less.

What is Priapism?

Definition:

- It is a case where there is prolonged, painful erection that fails to subside despite orgasm..
- Or, An erection lasting longer than 4-6 hours is considered to be priapic

Pathogenesis:

- A failure of the detumesence mechanism which may be due to:

a) Excess release of contractile neurotransmitters.
b) Obstruction of drainage venules.
c) Malfunction of intrinsic detumesence.
d) Prolonged relaxation of the intra-cavernosal smooth muscles.

Complications of Priapism

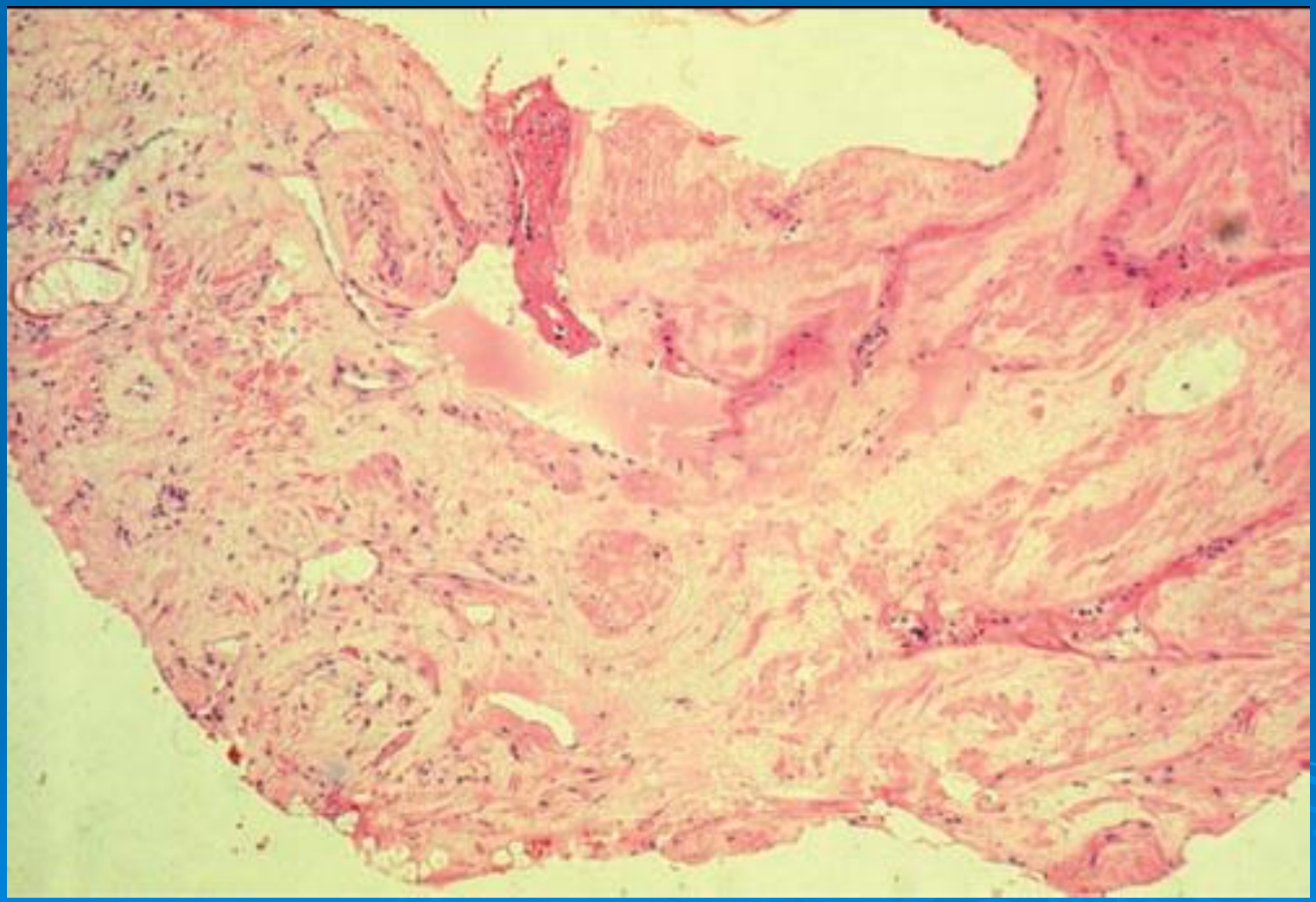
After 12 hours there is destruction of the sinusoidal endothelium.

6-12 hours: there is ischemia and acidosis in the cavernous tissue.

24-48 hours: starting of thrombosis in the cavernous spaces.

After48 hours complete fibrosis and necrosis.

Muscle necrosis after 36 hours of injection



Types of Priapism

There is two types of Priapism

High flow Priapism

(arterial / non-ischemic)

Low flow Priapism

(veno-occlusive / ischemic)

High flow Priapism (non-ischemic/arterial)

- Not regulated by Helicine artery
- Most common cause is trauma.
- Recurrence after detumesence.
- Normal venous outflow and Duplex .
- Not painful and not ischemic.
- On examination Penis is not tender.
- Blood→ bright red and high pO_2.

Causes of High-flow Priapism

- Perineal Trauma
- Very rarely sickle-cell disease
- Idiopathic

Low flow Priapism (ischemic/veno-occlusive)

- More common .
- Its associated with a low venous outflow and vascular stasis.
- Tissue hypoxia and acidosis.
- Painful due to ischemia.
- Blood is dark and high pCo2.

Causes of low-flow Priapism

- Hematological & Thrombolytic
- Oral medication
- ICI
- Metastatic
- Neurological causes
- Solid Tumors
- Idiopathic

- Hematological & Thrombolytic

  (sickle-cell disease and leukemia)

  - 28% of all cases of Priapism (most common cause in children)
  - 42% incidence in adults with sickle-cell disease
  - 64% incidence in boys with sickle-cell disease

- Neurological causes (spinal cord lesion)
  - lumbar disc lesions, spinal stenosis, seizure disorders, cerebrovascular disease
  - rare

- Oral medication: antidepressants, alpha-blockers, antihypertensives, heparin & cocaine abuse.

- Metastatic
- Idiopathic (30-50years)
- ICI

Evaluation and Management of Priapism

- Priapism is an emergency. Treatment should be started 4-6 hours of onset.
- Goal is to abort the erection, thereby preventing permanent damage to the corpora (ED) and to relieve pain.
- Principle is to restore arterial inflow and venous outflow.

(1) Clinical and drug history

- Penile or Perineal trauma → Cavernosal artery Or Corporal tissue fistula??
- Spinal cord injuries??
- TTT of malignancy as cancer bladder, prostate, rectosegmoid & blood disease??
- Intercorporal injections ??
- Oral medication Trazodone (antidepressant), hydralazine, prozasin, guanthidine, heparin and cocaine abuse??

(2) Physical examination

A) General examination for:

1. Abdominal masses → Priapism due to malignancy??
2. Enlarged lymph nodes.
3. Signs of trauma.

- B) Local examination for:

Glans penis ..(normally soft) .

1. The corpora cavernosa is 100% rigid in low flow Priapism.

2. In contrast, high flow Priapism usually causes 60-100% rigidity.

Laboratory investigation

1. C.B.C & Sickle cell preparation.
2. Blood gases and visual inspection of the blood (bright in high flow, dark in low flow).
3. Doppler study→ increase arterial blood flow in cavernous vessels in high flow Priapism.

4.Low flow Priapism

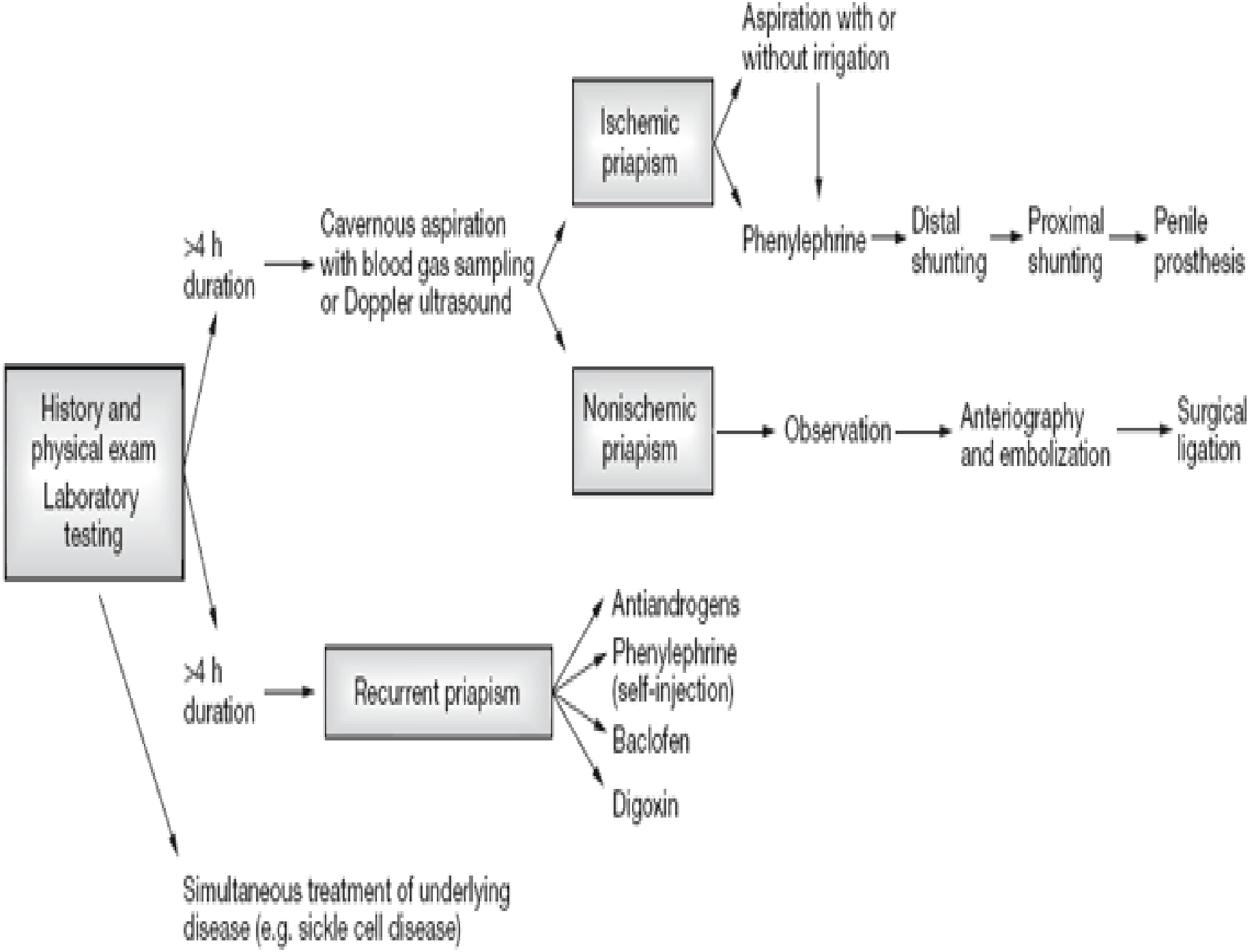
Dark blood

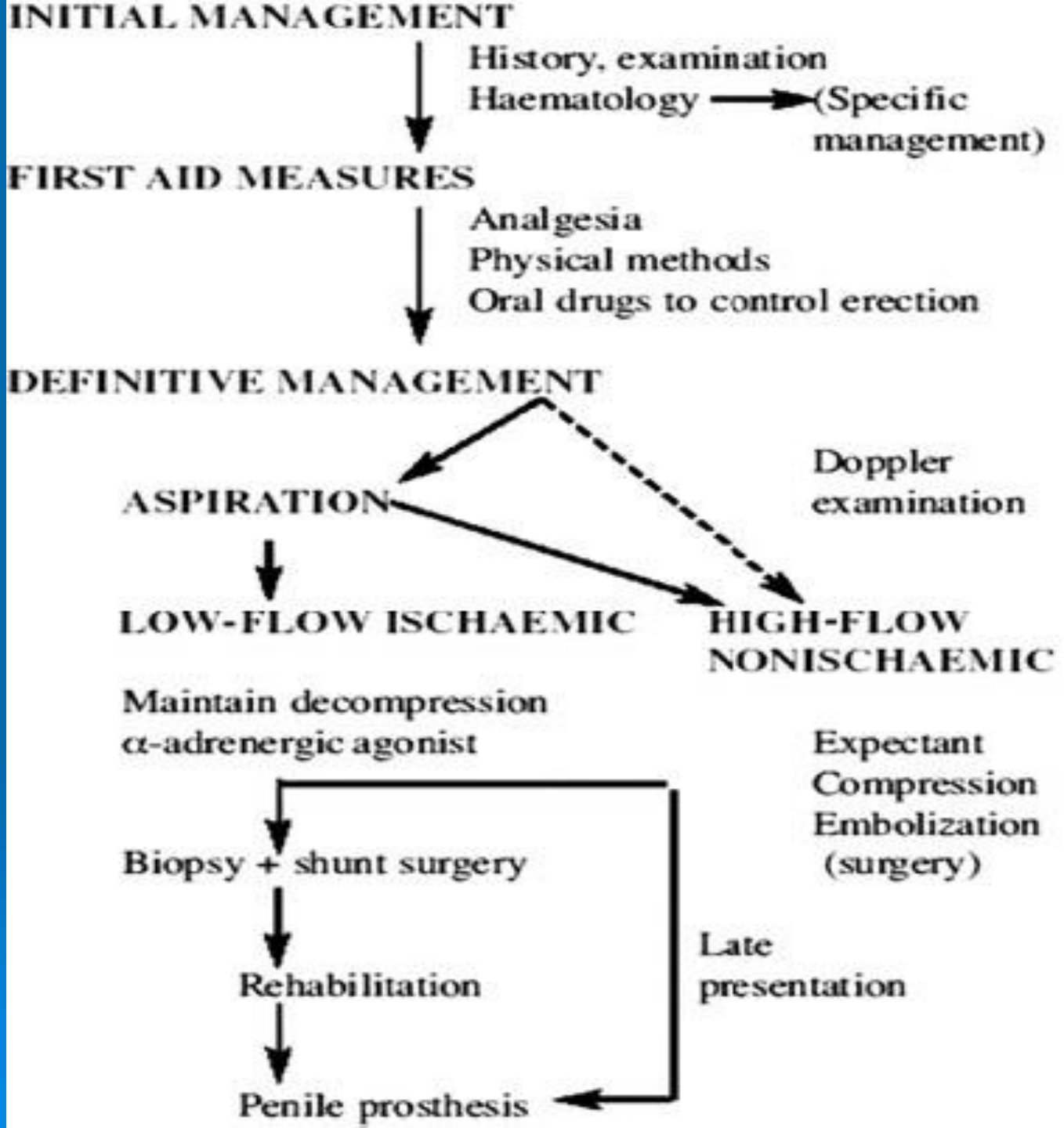
Ph low…<7.25

pO2 low…<30

pCo2 high…<60

Treatment of Priapism


History and physical exam
Laboratory testing
>4 h duration
Cavernous aspiration with blood gas sampling or Doppler ultrasound
Ischemic priapism
Aspiration with or without irrigation
Phenylephrine
Distal shunting
Proximal shunting
Penile prosthesis
Nonischemic priapism
Observation
Anteriography and embolization
Surgical ligation
>4 h duration
Recurrent priapism
Antiandrogens
Phenylephrine (self-injection)
Baclofen
Digoxin
Simultaneous treatment of underlying disease (e.g. sickle cell disease)


INITIAL MANAGEMENT
History, examination
Haematology
(Specific management)
FIRST AID MEASURES
Analgesia
Physical methods
Oral drugs to control erection
DEFINITIVE MANAGEMENT
ASPIRATION
Doppler examination
LOW-FLOW ISCHAEMIC
HIGH-FLOW NONISCHAEMIC
Maintain decompression
α-adrenergic agonist
Expectant
Compression
Embolization
(surgery)
Biopsy + shunt surgery
Rehabilitation
Penile prosthesis
Late presentation

Medical management of low-flow Priapism

- aspiration of the corpora with a 21G butterfly needle followed by an injection of :

  Phenylephrine (α1 adrenergic agonist) the best agent every 5 minutes until detumesence

  - 10mg/ml phenylephrine in 20mls saline for irrigation

  Ephedrine 50-100mg injection.

- Oral terbutaline (β-adrenoceptor agonist) - 5-10mg tab.

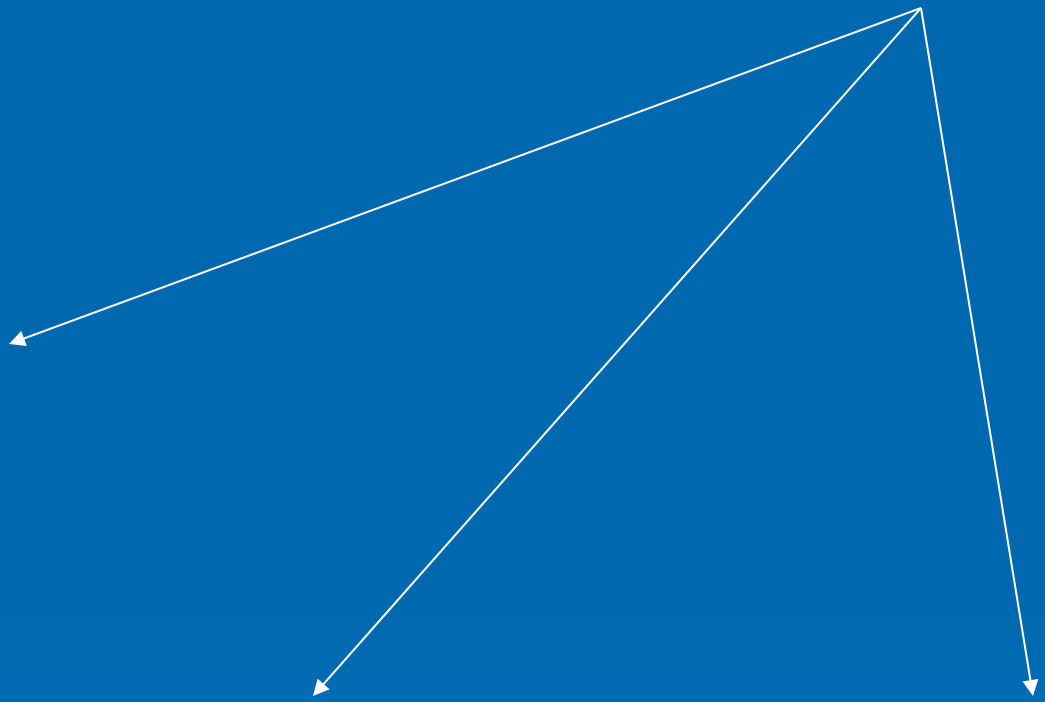
- If detumesence is not attained after 15 cycles of irrigation surgical measures should be started.

- In Sickle-cell patients:

  prompt and conservative as it recurs
  - Hydration
  - Oxygenation
  - Metabolic
  - Alkalinization
  - Aspiration and injection (as above)

Surgical management of low-flow Priapism

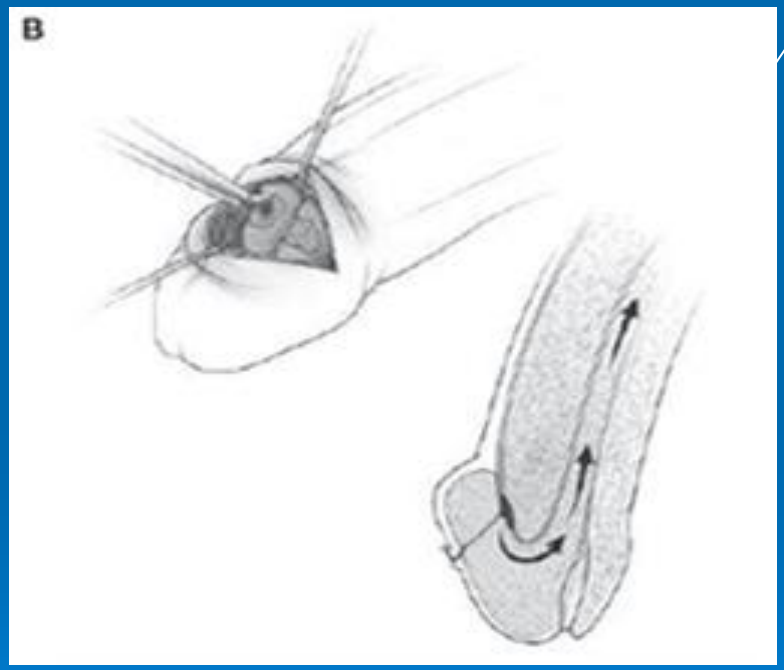
The basic principle of the following techniques is to "***shunt***" blood from the corpora cavernosa to



- Glans penis
- Corpus spongiosum
- Saphenous vein

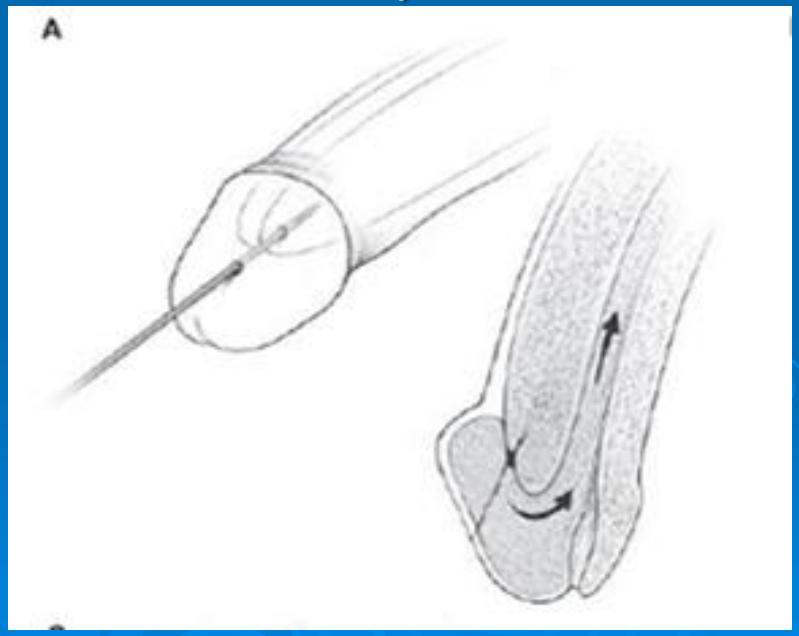
Types of shunts and there names

a) Shunt from the Corpora to the Glans



- Al-Ghourab technique
  (otherwise known as the open method)

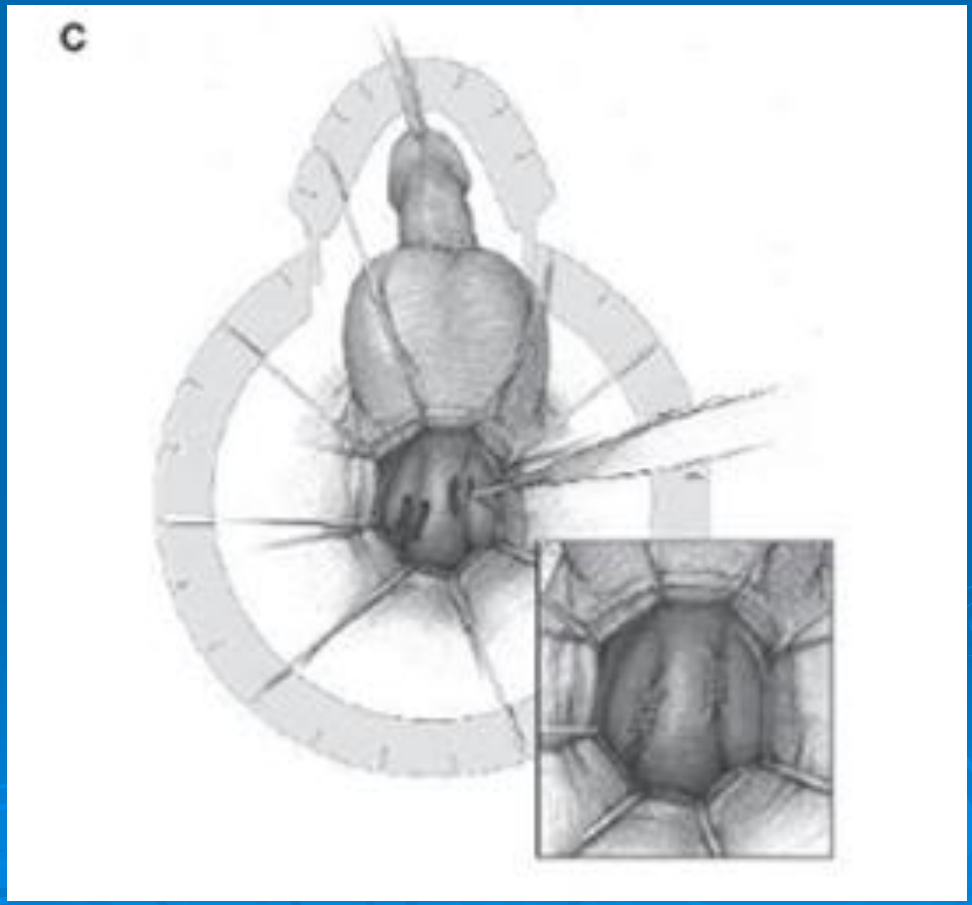
- Winter's technique
  (otherwise known as the closed method)



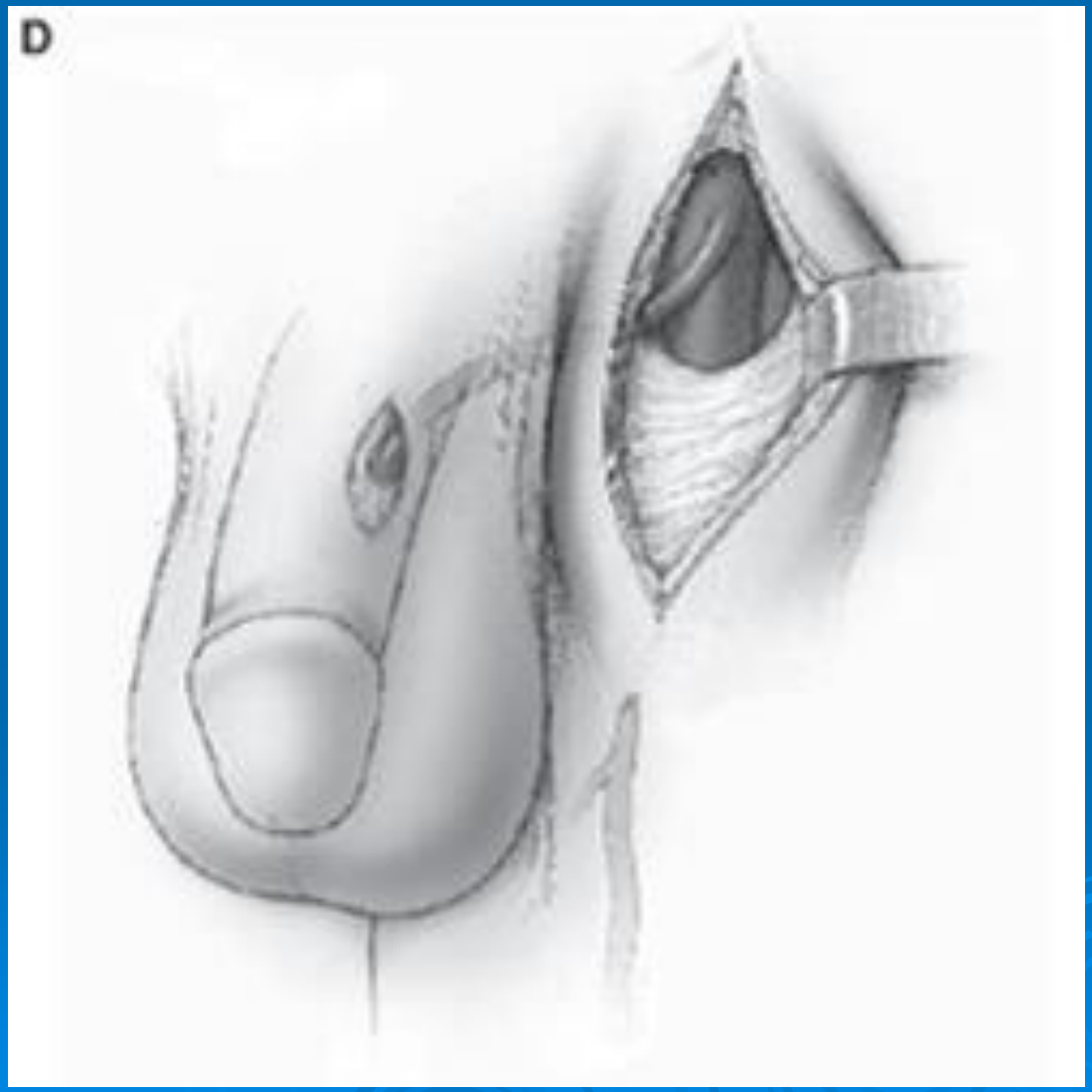
using a Trucut needle

b) Shunt from Corpora Cavernosa to the corpus spongiosum

2 longitudinal incisions are made in the corpora cavernosa and the adjacent part of corpus spongiosum….



c) Shunt from Corpora Cavernosa to the saphenous vein



Management of High-flow Priapism

- Ice pack $\rightarrow$ arterial spasm
- arteriography and embolisation of the internal pudendal artery or a branch


Thank you